

MSC Guidelines for Review of Industrial Systems

Procedure Number: E1-15

Revision Date: 04/24/00

Machinery References

- a. Title 46 CFR 58.60
 - b. API – RP 14C Recommended Practice for Analysis, Design, Installation and Testing of Basic Surface Safety Systems for Offshore Production Platforms
 - c. API – RP 53 Recommended Practice for Blowout Prevention Equipment Systems for Drilling Wells
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Electrical References

- d. Title 46 CFR 111.70
 - e. National Electric Code, current edition
 - f. IEEE Standard 45: Sections 20, 43
 - g. Navigation and Vessel Inspection Circular (NVIC) 2-89, Section 6.1
 - h. IEC 332-3, Cable Penetrations through Watertight Boundaries
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Disclaimer

These guidelines were developed by the Marine Safety Center staff as an aid in the preparation and review of vessel plans and submissions. They were developed to supplement existing guidance. They are not intended to substitute or replace laws, regulations, or other official Coast Guard policy documents. The responsibility to demonstrate compliance with all applicable laws and regulations still rests with the plan submitter. The Coast Guard and the U. S. Department of Transportation expressly disclaim liability resulting from the use of this document.

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Definitions

Industrial System - an industrial system is a system that—

- (1) Is not a ship's service load, (i.e. electrical equipment for all auxiliary services necessary for maintaining the vessel in a normal, operational and habitable condition). Ship's service loads include, but are not limited to, all safety, lighting, ventilation, navigational, communications, habitability,

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and propulsion auxiliary loads. Electrical propulsion motor, bow thruster motor, cargo transfer, drilling, cargo refrigeration for other than Class 5.2 organic peroxides and Class 4.1 self-reactive substances, and other industrial type loads are not ship's service loads. Ref. 46 CFR 111.107-1 & 111.10-1

- (2) Is used only for the industrial function of the vessel.
- (3) Is not connected to the emergency power source; and
- (4) Does not have specific requirements addressed elsewhere in subchapter J.

Industrial Personnel - means every person carried on board an industrial vessel for the sole purpose of carrying out the industrial business or functions of the industrial vessel. Examples of industrial personnel include tradesmen, such as mechanics, plumbers, electricians, and welders; laborers, such as wreckers and construction workers; and other persons, such as supervisors, engineers, technicians, drilling personnel, and divers.

API - RP- American Petroleum Institute - Recommended Practice

Applicability

This instruction applies to the following industrial systems on board mobile offshore drilling units (MODU's):

- (a) Cementing systems.
- (b) Circulation systems, including--
- (c) Pipes and pumps for mud;
- (d) Shale shakers;
- (e) Desanders; and
- (f) Degassers.
- (g) Blow out preventor control systems.
- (h) Riser and guideline tensioning systems.
- (i) Motion compensation systems.
- (j) Bulk material storage and handling systems.
- (k) Other pressurized systems designed for the MODU's industrial operations.

In addition to the above MODU systems, this instruction applies to the following industrial systems on board any class of vessel covered under subchapter J:

- (a) Cable laying equipment
- (b) Cargo transfer
- (c) Cargo refrigeration
- (d) Drilling equipment
- (e) Dredging equipment
- (f) Pile driving equipment

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Propulsion and bow thruster motors are not industrial systems. They have specific requirements under subchapter J (111.35).

General Review Guidance

- ❑ Verify that the industrial system under review has been analyzed by a registered professional engineer by ensuring that the PE's certification appears on each diagram and/or analysis submitted, and ensure that the plans were submitted in accordance with 46 CFR 50.20-5. (Ref. 46 CFR 58.60-11)
- ❑ Ensure that standards and/or specifications for non-pressurized, mechanical or structural systems, and components such as derricks, drawworks, and rotary tables not referenced by regulations are referenced on the plans or in the specifications of the unit. (Ref. 46 CFR 58.60-11)
- ❑ Determine if substitutes for fittings, material, apparatus, equipment, arrangements, calculations, and/or tests required are acceptable and provide an equivalent level of safety. (Ref. 46 CFR 58.60-2)
- ❑ Ensure that the industrial systems under review have been designed and analyzed in accordance with the principles of API RP 14C. (Ref. 46 CFR 58.60-9)
- ❑ Ensure that the industrial system is not located in a space that is concealed; or inaccessible to industrial personnel. (Ref. 46 CFR 58.60-5).
- ❑ Ensure that piping for the industrial systems meets ANSI B31.3, and/or ensure that blow out preventor control systems also meet API RP 53. (Ref. 46 CFR 58.60-7)
- ❑ Normal cable requirements of subchapter J do not apply. Except when a cable penetrates a watertight bulkhead, UL listed marine cable and other IEEE or IEC compliant cable is not necessary-- insulated conductors (including aluminum) in raceway or cable trays as allowed by the NEC are acceptable.
- ❑ For motors in industrial systems:
 - The feeder ampacity is determined from motor HP. Use tables 430-147 through 430-150 to get full load amps (FLA) from motor HP. The conductor shall be rated no less than 125% of the FLA of the largest motor plus the FLA of all the rest of the motors (NEC 430-21 through 430-25).

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- The short circuit protection has to be able to carry the starting current of the motor. Dual element fuses are to be rated between 175% and 225% the FLA. Molded case circuit breakers are to be rated 225% and 400% of the FLA. Other requirements as listed below may apply if ratings do not fall within these ranges.
- Grounding for vessel should only be at ship's service switchboard. Applicable ground detection should be installed. (46 CFR 111.05)
- Check electrical equipment in hazardous locations (46 CFR 111.105)
- Transformers should have overcurrent protection on both the secondary and the primary sides. Primary protection should be between 125% to 250% of the primary FLA; secondary protection should be between 100% to 125% of the secondary FLA. Other requirements may apply if ratings do not fall within these values (NEC 240-3(f)).
- If a single element (non-time delay) fuse is used for motor short circuit protection, it must be between 175– 400% of the motor FLA. If the motor FLA is greater than 600 Amps, the fuse must be between 175– 400% (NEC 430-52).
- If an electronic, instantaneous trip type breaker is used for motor short circuit protection, it must be between 175– 800% of the motor FLA (NEC 430-52).
- A single phase 2-wire or delta-delta transformer connection only needs primary short circuit protection. The protection should be according to NEC table 450-3 (a) or (b), as applicable (NEC 240-3(f)).
- Verify that switchgear meets 46 CFR 110.10. (46 CFR 111.70(b)(1))
- Where the industrial system has a dedicated internal combustion engine prime mover for a generator set, it must shut down upon overspeed or loss of lube oil pressure (46 CFR 111.12-1(b),(c)).
- Check cable penetration requirements (46 CFR 111.60-5 and IEEE Std 45 Sec 18.13.5 or IEC 332-3)

Attachments

None